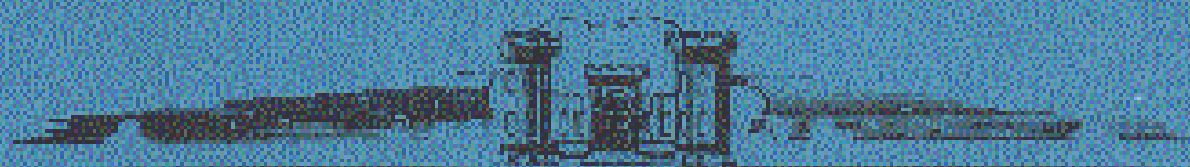


NARRAGANSETT BAY
AT THE MOUTH OF
NARRROW RIVER
NARRAGANSETT
RHODE ISLAND

SURVEY
(REVIEW OF REPORTS)



NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U. S. ARMY
BOSTON, MASS. DECEMBER 28, 1949

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NOT FOR PUBLIC RELEASE

SURVEY

(REVIEW OF REPORTS)

OF

NARRAGANSETT BAY AT THE MOUTH OF NARROW RIVER,
NARRAGANSETT, RHODE ISLAND

SYLLABUS

The Division Engineer finds that the benefits that would accrue from the improvement of Narrow River are relatively small and local in character, and that the establishment of a harbor of refuge in this locality is not required. He, therefore, recommends no improvement of Narrow River at this time.

NOT FOR PUBLIC RELEASE

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION
BOSTON, MASS.

December 28, 1949

SUBJECT: Survey (Review of Reports) of Narragansett Bay at the mouth of Narrow River, Narragansett, Rhode Island.

TO: The Chief of Engineers, Department of the Army, Washington 25, D. C.

AUTHORITY

1. This report is submitted in compliance with the following resolution adopted June 10, 1947, by the Committee on Public Works of the United States Senate, which reads as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902 be, and is hereby requested to review the report on Narragansett Bay at the mouth of Narrow River, Rhode Island, submitted in House Document Numbered 57, Fifty-first Congress, First Session, and other reports, with a view to determining whether improvements are advisable at the present time."

The study was assigned by the Chief of Engineers by letter dated June 26, 1947.

REPORT UNDER REVIEW

2. The report under review is a survey report submitted by the War Department December 17, 1889, and is favorable to the construction of a breakwater at the mouth of the Narrow River.

DESCRIPTION

3. Narrow River is in Narragansett Pier, a developed section of the town of Narragansett, which lies on the southerly shore of Rhode Island, and on the Western Passage into Narragansett Bay. It is a short, narrow inlet connecting the Pettaquamscutt River and Pettaquamscutt

Cove to the Western Passage at a point approximately 1 mile north of Narragansett Upper Pier. The mouth of the river is about six miles sailing distance southwesterly from Newport, five miles southerly from Dutch Island Harbor, and six miles northeasterly of Point Judith. The locality is shown on United States Coast and Geodetic Charts No. 1210 and No. 353, and on the accompanying plan.

4. The river is about three-quarters of a mile long and varies in width from about 200 feet at the mouth, to a maximum of 450 feet, about a quarter mile above the mouth, and to a minimum of 100 feet near the entrance at Pottaquamscutt Cove. The mean range of tide is 3.5 feet, and the spring range is 4.4 feet.

5. There is a narrow channel in the river which has depths at mean low water of 3.0 feet in the entrance channel and from 4.5 to 7.8 feet between the mouth and the Sprague Bridge, located about 500 feet below Pottaquamscutt Cove. Depths between the bridge and the cove vary from 6.2 to 9.4 feet.

TRIBUTARY AREA

6. The immediate tributary area comprises the town of Narragansett, and the villages of Wakefield and Peace Dale. Narragansett, of which Narragansett Pier is the principal section, is primarily a summer resort. It has no industries and the principal source of income is the summer resort business. It had a permanent population in 1940 of 1,560. The permanent population is substantially increased in the summer season. The assessed real estate valuation in 1944 was \$6,000,000. The neighboring villages of Wakefield and Peace Dale, which lie three or four miles to the westward, are chiefly engaged in the manufacture of cotton and woolen goods. These villages are in the town of South Kingston, which had a population of 7,292 in 1940.

7. The main line of the New York, New Haven & Hartford Railroad, passes through South Kingston, a town about eight miles west of Narragansett Pier. The Narragansett Pier Railroad connects with this main line at South Kingston. Frequent bus service is available at Narragansett Pier to Providence, Rhode Island, and to points in Connecticut.

BRIDGES

8. The only bridge crossing the river is the fixed, single span bridge on United States Highway Route No. 1, located 0.6 miles above the mouth of the river. This bridge, plans for which were approved by the Secretary of War, was constructed in 1921 and provides a horizontal clearance of 100 feet and a vertical clearance of 19.0 feet above mean high water.

PRIOR REPORTS

9. There have been two previous reports on Narragansett Bay at the mouth of Narrow River, a preliminary examination and a subsequent survey report, both of which are published in House Document No. 57, 51st Congress, First Session. The survey report was favorable to the construction of a stone breakwater at the south side of the mouth of Narrow River, at an estimated cost of \$24,000. Congress never adopted this project.

EXISTING CORPS OF ENGINEERS PROJECT AND OTHER IMPROVEMENTS

10. There is no Federal project for Narrow River. Local interests have provided no improvements in this waterway for the benefit of general navigation.

TERMINAL AND TRANSFER FACILITIES

11. There are no piers or landings on Narrow River.

IMPROVEMENT DESIRED

12. A public hearing was held at the Town Hall of Narragansett, Rhode Island on July 23, 1948, to ascertain the improvements desired by local interests. Present at the hearing were members of the House of Representatives of the State of Rhode Island, town officials of Narragansett, representatives of yacht clubs and real estate associations, several local residents, and other interested parties.

13. No definite plan of improvement was advanced by local interests. The discussion indicated a general desire for deepening the river and constructing a breakwater at its mouth. These improvements were advocated as a means of creating a harbor of refuge which proponents claimed to be necessary in this general locality because there is no anchorage readily accessible in the event of squalls or sudden storms. It was further claimed that the lack of such refuge reduces recreational boating and commercial fishing in the area.

14. The breakwater was desired as a means for maintaining the channel depth at the entrance to the river. It was claimed that the entrance has shoaled considerably as a result of the effects of two hurricanes in recent years, and also as a result of a change in currents caused by the erection in 1864 of a breakwater at the north side of the entrance. The breakwater was erected by the contractor engaged in the construction of Fort Adams at Newport, and used as a shelter for barges which loaded stone quarried in the vicinity.

15. The improvement was also advocated by a few owners of party boats who desired to locate in the river. These boats are chartered for sport fishing. It was the general agreement of all proponents of the improvement that the development of a commercial fishing industry or any other commercial expansion of the harbor, except as a base for party

boats was not desired because of the town's outstanding reputation as a summer resort.

16. The desired breakwater is one of the two jetties included in the plan of beach improvement and erosion control previously proposed by local interests as an alternate to the plan considered by the Corps of Engineers, which includes a system of seven groins.

COMMERCE

17. There are no records of commerce in Narrow River at any time. At one time, a small amount of shipping was landed at Narragansett Pier, outside the Narrow River area. This is believed to have ceased shortly after the year 1913.

VESSEL TRAFFIC

18. There are no records of vessel traffic in the river. The river is used by a few small craft.

DIFFICULTIES ATTENDING NAVIGATION

19. The principal difficulties in navigating the river are those attendant upon shoal water and limited width in the natural channel. The natural channel in the entrance narrows down to a 30-foot width adjacent to a large ledge at the mouth. There are also a few large clumps of rocks at the entrance which are not marked. These conditions make entrance to the river very hazardous, and limits the river's use to boats familiar with the channel. The shoals in the natural channel limit its transit to periods of high water.

WATER POWER AND OTHER SPECIAL SUBJECTS

20. Narrow River is the only connection between open water and Pettaquamscutt River and Cove. These latter bodies of water lie in a narrow valley about seven miles long. There are numerous estates and several small settlements in the valley. While being principally tidal,

the waterway serves as the natural drainage system of the area. Pollution of the waterway is causing concern to local authorities who claim former shellfish beds in Narrow River have been destroyed. The dredging of a channel in Narrow River for reasonable navigation purposes would not have an appreciable effect upon the reduction of pollution in the waterway. There are no problems involved in this investigation relative to water power, water supply, flood control, and related subjects. None of the contemplated work will have an adverse effect on wildlife or shellfish.

PLAN OF IMPROVEMENT

21. The plan of improvement discussed herein is considered to be the most feasible and economical plan which would adequately serve the needs of general navigation in the river. The plan comprises the following:

a. A channel 75 feet wide, 6 feet deep at mean low water, extending approximately 3,000 feet up river from deep water in Narragansett Bay;

b. A turning basin 600 feet long, 100 feet wide, 6 feet deep at mean low water, on the west side of the uppermost channel reach.

c. A 700-foot long, sand-tight jetty, projecting 550 feet southeast of the mean high water line at a point 300 feet south of the south side of the entrance, and having a top width of 5 feet at an elevation of 9 feet above mean low water, and side-slopes of 1 on 1-1/2.

This plan is based upon the results of hydrographic surveys made in 1946, and topographic surveys made in 1945 and 1946.

AIDS TO NAVIGATION

22. The United States Coast Guard has been consulted on the matter of aids to navigation and has advised that nine channel markers would be

required to mark the channel and basin, and two fixed range poles to mark the entrance. This can be accomplished at a cost of \$5,500, with \$100 for annual maintenance.

SHORE LINE CHANGES

23. The desired improvement will have no adverse effect upon the shore line. The area under study is at present subject to a concurrent cooperative beach erosion study with the State of Rhode Island. Investigation in connection with this study indicates that the littoral drift is from the southwest to northeast along the beach southwesterly of the river to Upper Narragansett Pier, and that there is very little material available for transport from the area southwest of the Upper Pier. The jetty, if constructed, would trap materials moving from the southwesterly end of the beach and prevent their movement into the river. The easterly side of the river's mouth is marked by Cormorant Point, a rocky and boulder strewn point jutting into Narragansett Bay. Since the outer end of the proposed jetty, if constructed, would not extend to the tip of the point, it would not have any other effect upon the shore northeast of Cormorant Point than the Point itself.

ESTIMATES OF FIRST COST

24. The estimates of first cost of the improvements are based on the material being removed by dipper dredge with disposal being made at sea. The estimated unit price is based on current price levels and include the costs of engineering and overhead, and also takes into consideration the following factors: (a) the exposed nature of the outer area, (b) the comparatively small amount of material to be removed, and (c) the character of the material which consists of mud, sand, clay, cobbles and boulders which are strewn about the river's mouth. The estimate of costs for aids to navigation were furnished by the Coast Guard.

a. Construction

(1) Dredging channel, mouth to upper limit.--
23,000 cubic yards at \$1.75 . . . \$40,250

(2) Dredging turning basin.--
17,000 cubic yards at \$1.75 . . . \$29,750

TOTAL COST OF DREDGING \$70,000

(3) Constructing sand-tight stone jetty.
Approx. 7,800 tons at \$10.00. . . \$78,000

TOTAL COST OF JETTY \$78,000

TOTAL COST OF CONSTRUCTION \$148,000

b. Aids to Navigation

Installing channel markers and fixed
ranges \$ 5,500

TOTAL COST OF AIDS TO NAVIGATION \$ 5,500

TOTAL PROJECT COST \$ 153,500

ESTIMATES OF ANNUAL CHARGES

25. The estimated annual carrying charges have been computed on an assumed life of 40 years for the improvement, on the assumption that local interests will make a cash contribution of 50 percent toward the initial construction cost, and at interest rates of 3 percent for the Federal investment and 3.5 percent for the non-Federal investment. Maintenance costs for aids to navigation were furnished by the Coast Guard.

a. Investment

Federal Investment

Construction Cost (Corps of
Engineers) \$74,000

Aids to Navigation (Coast
Guard) \$ 5,500

TOTAL FEDERAL INVESTMENT \$ 79,500

Non-Federal Investment

Construction Cost \$74,000

TOTAL NON-FEDERAL INVESTMENT \$ 74,000

b. Federal Annual Carrying Charge

Interest on Investment \$ 2,380

Amortization of Investment \$ 1,070

Estimated Annual Maintenance

Channel and Jetty . . . \$1,500

Aids to Navigation . . . \$ 100

\$ 1,600

TOTAL FEDERAL ANNUAL CARRYING CHARGE \$ 5,050

<u>c. Non-Federal Annual Carrying Charge</u>	
Interest on Investment.....	\$2,590
Amortization of Investment.....	\$ 860
TOTAL NON-FEDERAL ANNUAL CARRYING CHARGE.....	\$ 3,450
<u>d. Total Annual Carrying Charge</u>	
Federal.....	\$5,050
Non-Federal.....	\$3,450
TOTAL ANNUAL CARRYING CHARGE.....	\$ 8,500

ESTIMATES OF BENEFITS

26. The benefits which might be anticipated from the desired improvement are those associated with the establishment of a harbor of refuge, and a small boat harbor for commercial fishermen and recreational boating.

27. It is not considered that any appreciable general benefit could be assigned to the development of a harbor of refuge at this location since existing adequate refuges are available at Dutch Island, which is five miles north of Narrow River, and at Point Judith, which is six miles south.

28. All proponents of the improvement are strongly opposed to the development of any industry, commercial or fishing, in the river, except a base for chartered party boats for sport fishing. While it is probable that party boats would be based in the improved river, it is not considered that any considerable general benefit would result since many of the boats would be transferred from other harbors.

29. General benefits to be derived from the expansion of the local recreational fleet are also negligible as there are no indications that expansion of the existing fleet would be effected.

COMPARISON OF BENEFITS AND COSTS

30. A direct monetary comparison between benefits and costs is not rendered, since the negligible benefits have not been evaluated. The annual costs of the desired improvement would greatly exceed the value of any benefits which could be derived therefrom.

PROPOSED LOCAL COOPERATION

31. Local interests have not indicated willingness to make any cash contribution toward the construction of the improvement. However, in view of the very small amount of general benefits which could be derived from the improvement, local interests should be required to make a substantial contribution toward the work. It is considered that such a contribution should not be less than 50 percent of the initial construction cost. In addition, they should be required to provide all lands, rights-of-way, and easements necessary for the work, including spoil areas and bulkheads as required, and to hold and save the United States free from claims for damage arising from the accomplishment of the work.

COORDINATION WITH OTHER AGENCIES

32. All Federal, State, and local agencies having interests in the development and use of waterways, were notified of the hearing held July 23, 1948, on the desired improvement. The views of the Division Engineer and the findings contained in this report have been subsequently discussed with local interests who are in agreement therewith.

DISCUSSION

33. Narrow River is a small tidal inlet, which connects the Pettaquamscutt River and Cove to Narragansett Bay about a mile above Narragansett Pier, Rhode Island. Navigation into the river is limited to boats with shallow draft due to a controlling depth of 3.0 feet at the entrance and to depths elsewhere in the river which vary from 40.5 to 7.8 feet.

34. Local interests in requesting the desired improvement stressed the need for additional refuge in the vicinity of the Western Passage into Narragansett Bay. They cited the substantial increase in recreational

boating since the war, most of which occurred in the smaller class of boats which are under 50 feet in length. These smaller boats hesitate to make the run from the Western Passage around Point Judith because the run is in open water entirely exposed to any sudden storms or squalls. It was claimed that a harbor of refuge at Narrow River would make this run less hazardous. However, since the harbors of refuge at Dutch Island and Point Judith are adequate for the existing and anticipated boating in the locality, and since the sailing time in either direction from any point in between them is comparatively short, it is not considered that sufficient general benefits can be derived to justify the establishment of an additional refuge at Narrow River.

35. Narragansett Pier, in which the Narrow River is located, is a nationally famous summer resort. Since its business is chiefly recreational, the town favors only improvements that will exclusively benefit this business. It was claimed that the provision of a safe harbor would expand the local recreational fleet and attract a greater number of yachts and pleasure craft than now visit the area. This claim is considered to be largely conjectural since very little substantiating evidence was introduced at the hearing. A majority of yachtsmen favored the improvement as a place of refuge only. It was also claimed that a safe harbor would provide a base of operation from which a number of charter boats could operate, and a few charter boat operators from other ports expressed a desire to locate in the area in the event of the improvement. Since the transfer of boats from one port to another creates only minor additional general benefits, it is considered that improvement for this purpose is not warranted. There are no records of any commerce in the river. The town's desire to maintain its excellent reputation as a summer resort precludes any commercial development of the river. All proponents of the desired improvement were strongly opposed to any com-

mercial development, either as a base for industry or for commercial fishing. A base for charter boats for sport fishing only was desired. Thus, no benefits can be expected through commercial development of the river.

36. Another reason advanced locally for the desired project was the improvement of the beach southwest of the river. It was desired to build up the beach with dredged materials. It was also claimed that the jetty would aid in the prevention of erosion along the beach. The Beach Erosion Board in its report on Beach Erosion Control on the south shore of the State of Rhode Island, dated December 4, 1948, recommended placing artificial fill on the beach between the Upper Pier and Narrow River, and the construction of a groin system as the best method of stabilizing the fill. Local interests have proposed the construction of jetties at either end of the beach, with an intermediate groin if necessary, in lieu of the recommended groin system as a method of stabilizing the artificial fill. The Chief of Engineers in his recommendations, dated August 29, 1949, generally agreed with the recommendations of the Beach Erosion Board. It is considered that the local proposal to dredge Narrow River and construct a jetty was based in part on a desire to accomplish the locally favored beach improvement.

37. Local interests have not advanced any proposals as to the length or direction of the desired jetty, or length, width, and depth of the desired channel and turning basin. For purposes of this study, the channel, basin, and jetty shown on Plate No. 1 accompanying this report was developed as the most suitable plan which would serve the needs of navigation in the river. The jetty was laid out in accordance with local proposals made for a substitute structure for beach erosion control as noted in the previous paragraph, except for a slight northerly change in its direction to give greater protection to the dredged channel.

The jetty, as noted previously, would be effective for a time in preventing the accumulation of material in the channel, but after its effectiveness was lost a much higher charge for maintaining the channel to project depth would result. The channel 75 feet wide and 6 feet deep at mean low water would be adequate for all the existing and anticipated recreational and commercial boating in the area, since the improvement was desired mainly for boats less than 50 feet in length and drawing less than 5.5 feet. The turning basin of 1.4 acres in area would supply anchorage for 17 to 24 boats depending on the method of anchoring. This is considered ample, as there are no records of any existing fleet based on the river, and no indications of any boats other than a few charter boats expressed a desire to locate there.

CONCLUSIONS

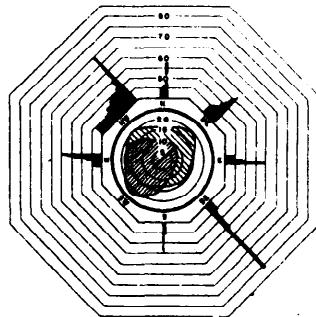
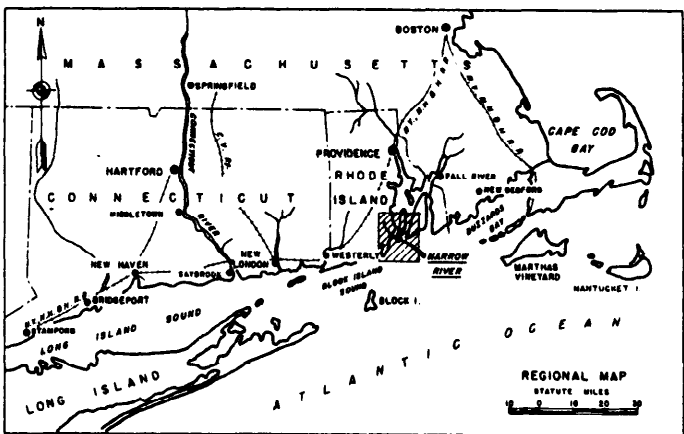
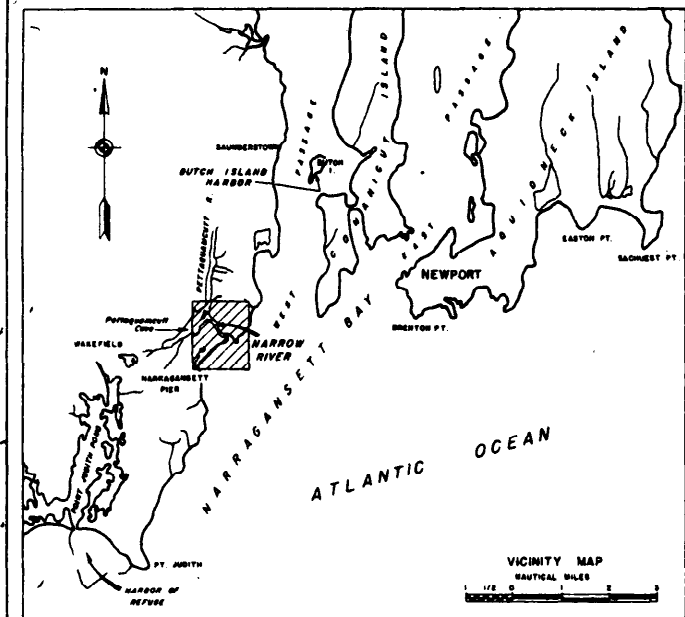
38. It is concluded that an additional harbor of refuge in the vicinity of the entrance to the Western Passage to Narragansett Bay is not required at this time. It is also concluded that present and potential future use of Narrow River will not develop sufficient general benefits to economically justify the development of a small boat basin at Federal expense.

RECOMMENDATIONS

39. It is recommended that no project for the improvement of Narrow River, Narragansett, Rhode Island, be adopted at this time.

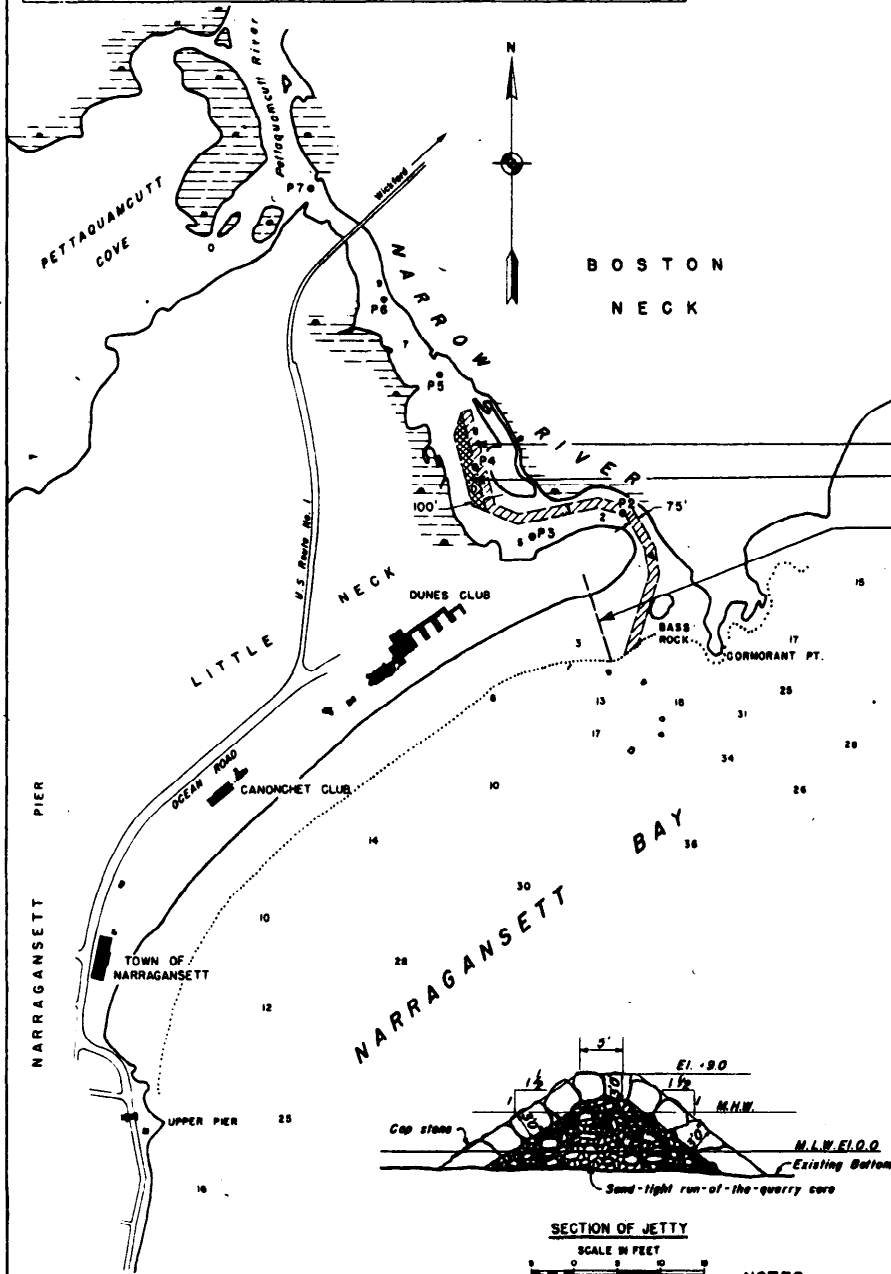
1 Incl.;
Plate 1

B. M. HARLOE
Colonel, Corps of Engineers
Division Engineer



WIND DIAGRAM FOR BLOCK ISLAND, R.I.

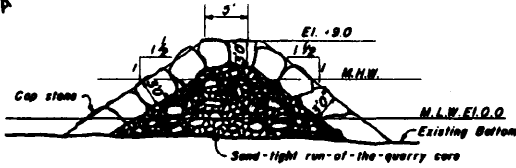
LEGEND
AVERAGE VELOCITY IN M.P.H. [Symbol]
DURATION IN PERCENT OF TIME [Symbol]
STORM WINDS IN M.P.H. [Symbol]



IMPROVEMENT CONSIDERED NOT RECOMMENDED
CHANNEL
75 feet wide, 6 feet deep M.L.W.
TURNING BASIN
100 feet wide, 700 feet long 6 feet deep M.L.W.
SAND-TIGHT STONE JETTY
700 feet long, top width 5 feet, 9 feet above M.L.W.

LIST OF PROBINGS			
NUMBER	DEPTH OF WATER	TOTAL DEPTH	PENETRATION IN FEET AND INDICATED MATERIAL
P2	6.1	10.8	4.5 Hard packed fine sand-cobble on top
P3	5.3	10.7	5.4 Hard packed fine sand to loose sand
P4	2.3	10.6	8.3 Sand and mud
P5	6.6	10.3	3.7 Mud and sand to cobble
P6	8.7	11.3	2.6 Mud and coarse sand
P7	7.0	11.1	4.1 Cobble, coarse sand and gravel

Depths are in feet and refer to the plane of Mean Low Water.



NOTES

Soundings are in feet and are referred to the plane of Mean Low Water.
Hydrography from surveys of 1946.
Topography from surveys of 1945-1946.
6-Foot contour shown thus [Symbol]

NARROW RIVER
NARRAGANSETT, R. I.

IN 1 SHEET
200' 0 400' 800' 1200' 1600' 2000'

NEW ENGLAND DIVISION, BOSTON, MASS. DEC. 20, 1949
APPROVAL RECOMMENDED
SUBMITTED
TO ACCOMPANY SURVEY
REPORT DATED DEC. 29, 1949
FILE NO. 9 222